WHAT IS CLAIMED IS:

1. A fast two-loop automatic-gain-control (AGC) method for automatically varying a gain control signal for a receiver's variable amplifier, comprising the steps of:

a) amplifying a received signal according to an adjustable gain value, wherein the adjustable gain value is based on a gain control signal;

b) converting the amplified received signal from analog to digital

c) calculating an indicator of the received signal's strength;

d) generating an error signal based on the indicator and a predetermined reference power level;

e) if a magnitude of the error signal bears a first relationship to a predetermined threshold value, then varying the gain control signal as a function of a fine-gain constant and the error signal; and

f) if the magnitude of the error signal bears a second relationship to the predetermined threshold value, then varying the gain control signal as a function of a coarse-gain constant and the error signal;

wherein the coarse-gain constant is larger than the fine-gain constant and the second relationship is complimentary to the first relationship.

2. The method according to claim 1, further comprising the steps of:

g) amplifying the error signal based on the fine-gain constant to generate a first signal;

h) amplifying the error signal based on the coarse-gain constant to generate a second signal; and

wherein if the magnitude of the error signal bears the first relationship to the predetermined threshold value, then varying the gain control signal in proportion to the first signal; and if the magnitude of the error signal bears the second relationship to the predetermined threshold value, then varying the gain control signal in proportion to the second signal.

3. The method according to claim 2, wherein:

the step of varying the gain control signal in proportion to the first signal includes the steps of:

if the magnitude of the error signal bears the first relationship to the predetermined threshold value, connecting the first signal, if not already connected, to an input of a feedback filter and disconnecting the second signal, if already connected, from the input of the feedback filter, wherein the feedback filter includes an output that varies in proportion to the input, and

varying the gain control signal according to the output of the feedback filter; and

the step of varying the gain control signal in proportion to the second signal includes the steps of:

if the magnitude of the error signal bears the second relationship to the predetermined threshold value, connecting the second signal, if not already connected, to the input of the feedback filter and disconnecting the first signal, if already connected, from the input of the feedback filter, and

varying the gain control signal according to the output of the feedback filter.

4. The method according to claim 3, wherein the feedback filter comprises:

a delay circuit configured to delay the output of the feedback filter one clock period; and

a signal combiner configured to add a current input to the feedback filter to the delayed output.

5. The method according to claim 1, wherein the step of calculating the indicator includes the steps of:

c.1) generating an in-phase signal based on the amplified received signal;

c.2) converting the in-phase signal from analog to digital ;

c.3) generating an out-of-phase signal based on the amplified received signal;

c.4) converting the out-of-phase signal from analog to digital;

c.5) calculating an in-phase signal power , wherein the in-phase signal power is substantially equal to the square of the converted in-phase signal averaged over a fraction of a spreading-symbol period;

c.6) calculating an out-of-phase signal power , wherein the out-of-phase signal power is substantially equal to the square of the converted out-of-phase signal averaged over the fraction of the spreading-symbol period; and

c.7) summing the in-phase signal power and the out-of-phase signal power to obtain the indicator.

6. The method according to claim 1, further comprising the steps of:

g) low pass filtering the indicator;

h) limiting the filtered indicator to be between a predetermined minimum value and a predetermined maximum value;

i) calculating a logarithm of the limited indicator; and

wherein generating of the error signal is based on the calculated logarithm of the limited indicator.

7. The method according to claim 1, further comprising the steps of:

g) calculating the exponential of the gain control signal;

h) converting the calculated exponential of the gain control signal from digital to analog; and

i) low pass filtering the converted gain control signal;

wherein the adjustable gain value of the variable amplifier is based on the low-pass-filtered, converted gain control signal.

8. The method according to claim 6, wherein the step of generating an error signal includes the steps of:

d.1) storing the predetermined reference power level; and

d.2) subtracting the logarithm of the limited indicator from the predetermined reference power level.

9. The method according to claim 1, wherein the first relationship corresponds to the magnitude of the error signal being less than or equal to the predetermined threshold value.

10. The method according to claim 1, wherein varying of the gain control signal is based on an amplified error signal that is generated by selectively connecting the error signal with only one of two signal multipliers to a feedback filter according to a magnitude of the error signal, wherein if the magnitude of the error signal bears the first relationship to the predetermined threshold value, the error signal is connected to a multiplier having the fine-gain constant outputting to the feedback filter and if the magnitude of the error signal bears the second relationship to the predetermined threshold value, the error signal is connected to a second multiplier having the coarse-gain constant outputting to the feedback filter.

11. The method according to claim 10, wherein varying of the gain control signal is based on the amplified error signal after being filtered by:

delaying the gain control signal; and

combining the amplified error signal with the delayed gain control signal.

12. A fast two-loop automatic gain control circuit for a receiver, comprising:

a receiver amplifier having at least a received signal and a gain control signal as separate inputs, wherein the receiver amplifier amplifies the received signal in proportion to an adjustable gain value controlled by the gain control signal;

a power meter configured to measure a received signal strength indicator associated with the amplified received signal;

a first signal combiner configured to generate an error signal, wherein the error signal is a function of a reference power level and the measured received signal strength indicator;

a feedback filter having as a first output the gain control signal input of the receiver amplifier;

a fine-gain loop, configured to receive, as input, the error signal and further configured to generate, a first signal for output to the feedback filter, the first signal being based on the error signal and a fine-gain constant;

a coarse-gain loop, configured to receive, as input, the error signal and further configured to generate a second signal for output to the feedback filter, the second signal being based on the error signal and a coarse-gain constant larger than the fine-gain constant; and

a selector circuit configured to selectively cause the fine and coarse loops to selectively apply only one of the loops at a time to drive the feedback filter, wherein

the fine-gain loop is selected when a magnitude of the error signal bears a first relationship to a predetermined threshold value such that the gain control signal varies according to the first signal;

the coarse-gain loop is selected when the magnitude of the error signal bears a second relationship to the predetermined threshold value such that the gain control signal varies according to the second signal; and

the second relationship is complimentary to the first relationship.

13. The automatic gain control circuit according to claim 12, further comprising:

a quadrature down-converter configured to separate the amplified received signal into an in-phase signal and an out-of-phase signal;

a first analog-to-digital converter configured to convert the in-phase signal from analog to digital ;

a second analog-to-digital converter configured to convert the out-of-phase signal from analog to digital; and

wherein the power meter comprises:

a first power calculator configured to output the square of the converted in-phase signal averaged over a fraction of a spreading-symbol period;

a second power calculator configured to output the square of the converted out-of-phase signal averaged over the fraction of the spreading-symbol period; and

a second signal combiner configured to sum the respective outputs from the first and second power calculators to obtain the received signal strength indicator.

14. The automatic gain control circuit according to claim 13, further comprising:

a power-shaping circuit connected between the power meter and the first signal combiner, comprising:

a low pass filter configured to receive the measured received signal strength indicator from the second signal combiner;

a gain limiter configured to receive a second output from the low pass filter and limit the value of the second output between a predetermined minimum and maximum value; and

a logarithm calculator, configured to calculate the logarithm of a third output from the gain limiter and provide the calculated logarithm to the first signal combiner.

15. The automatic gain control circuit according to claim 12, further comprising:

a magnitude calculator configured to calculate the magnitude of the error signal; and

a comparator configured to:

receive the calculated magnitude of the error signal,

receive the predetermined threshold value, and

output a decision value to the signal selector, wherein the decision value indicates which of the first and the second relationships is satisfied by the calculated magnitude of the error signal.

16. The automatic gain control circuit according to claim 15, wherein the first relationship corresponds to the calculated magnitude of the error signal being less than or equal to the predetermined threshold value.

17. The automatic gain control circuit according to claim 12, wherein the feedback filter comprises:

a delay circuit configured to delay the output of the feedback filter one clock period; and

a third signal combiner configured to add a current input to the feedback filter to the delayed output.

18. The automatic gain control circuit according to claim 12, further comprising a control signal shaper connected between the output of the feedback filter and the gain control signal input of the receiver amplifier, wherein the control signal shaper comprises:

an exponential calculator configured to calculate the exponential of the output of the feedback filter;

a digital to analog converter configured to receive and convert the calculated exponential from digital to analog; and

a low pass filter configured to:

receive and filter the converted, calculated exponential, and

output the filtered, converted, calculated exponential to the gain control signal input of the receiver amplifier.

19. The automatic gain control circuit according to claim 12, wherein:

the fine-gain loop comprises the fine-gain amplified error signal ;

the coarse-gain loop comprises the coarse-gain amplified error signal ; and

the selector circuit comprises:

a first input connected with the output of the fine-gain loop;

a second input connected with the output of the coarse-gain loop; and

wherein the selector circuit is configured to:

output the fine-gain amplified error signal to the feedback filter only when the magnitude of the error signal bears the first relationship to the predetermined threshold value; and

output the coarse-gain amplified error signal to the feedback filter only when the magnitude of the error signal bears the second relationship to the predetermined threshold value.

20. A fast two-loop AGC circuit for use in a communications transceiver, comprising:

(a) a receiver configured to receive a first communications signal and to amplify the received signal with a variable amplifier, wherein the receiver further comprises:

(a)(1) a quadrature downconverter connected with the variable amplifier configured to generate an in-phase signal and an out-of-phase signal;

(a)(2) a first analog-to-digital converter configured to generate a converted in-phase signal by converting the in-phase signal from analog to digital;

(a)(3) a second analog-to-digital converter to generate a converted out-of-phase signal by converting the out-of-phase signal from analog to digital

(b) a transmitter configured to transmit a second communications signal; and

(c) an automatic gain control circuit configured to generate a control signal to vary the gain of the variable amplifier, wherein the automatic gain control circuit further comprises:

(c)(1) a first power meter configured to measure a first power averaged over a fractional spread-symbol period associated with the converted in-phase signal;

(c)(2) a second power meter configured to measure a second power averaged over the fractional spread-symbol period associated with the converted out-of-phase signal;

(c)(3) a composite power meter configured to combine the first and second power into a composite power as the received signal strength indicator;

(c)(4) a first signal combiner configured to generate an error signal, wherein the error signal is a function of both the received signal strength indicator and a reference power level;

(c)(5) a fine-gain feedback filter configured to output the control signal, wherein the control signal varies proportionally to the error signal and a fine-gain constant;

(c)(6) a coarse-gain feedback filter configured to output the control signal, wherein the control signal varies proportionally to the error signal and a coarse-gain constant, wherein the coarse-gain constant is larger than the fine-gain constant;

(c)(7) a selector circuit configured to:

select only the fine-gain feedback filter when the error signal bears a first relationship with a predetermined threshold value; and

select only the coarse-gain feedback filter when the error signal bears a second relationship with the predetermined threshold value; and wherein the second relationship is complimentary to the first relationship.

21. The transceiver according to claim 20, wherein the transceiver is located in a base station.

22. The transceiver according to claim 20, wherein the transceiver is located in a mobile station.

23. The transceiver according to claim 20, wherein both the transmitted and received signals are non-spread-spectrum signals.

24. The transceiver according to claim 23, wherein both the transmitted and received signals are orthogonal frequency division multiplexing (OFDM) signals.

25. An automatic gain control circuit for a receiver, comprising:

a receiver amplifier having at least a received signal and a gain control signal as separate inputs, wherein the receiver amplifier amplifies the received signal in proportion to an adjustable gain value controlled by the gain control signal;

a power meter configured to measure a power level associated with the amplified received signal;

a first signal combiner configured to generate an error signal, wherein the error signal is a function of a reference signal level and the measured power level;

a loopback filter for supplying the gain control signal input to control the adjustable gain value of the receiver amplifier;

a selective-gain loop, configured to receive the error signal as input, and further configured to selectively generate first and second signals as outputs for application to drive the loopback filter, wherein: the first signal is based on the error signal and a first gain constant, and the second signal is based on the error signal and a second gain constant larger than the first gain constant; and

a control circuit coupled to control the selective operation of the selective-gain loop in response to a magnitude of the error signal, such that the selective-gain feedback loop outputs the first signal when the magnitude of the error signal bears a first relationship to a predetermined threshold value, and the selective-gain feedback loop outputs the second signal when the magnitude of the error signal bears a second relationship to the predetermined threshold value; and wherein the second relationship is complimentary to the first relationship.

26. An automatic gain control circuit for use with a digital receiver, the digital receiver including an amplifier having at least a received signal and a gain control signal as separate inputs, wherein the amplifier amplifies the received signal in proportion to an adjustable gain value controlled by the gain control signal and outputs an amplified signal for application to a digital to analog converter of the digital receiver, said automatic gain control circuit comprising:

a power meter for measuring a power level associated with the amplified received signal in response to a digitized output from the digital analog converter of the digital receiver;

a combiner for generating an error signal as a function of a reference signal level and the measured power level;

a selective-gain feedback loop for supplying the gain control signal input to control the adjustable gain value of the receiver amplifier, the selective-gain feedback loop being configured to:

receive the error signal as an input, and

selectively generate the gain control signal based on application of first and second gain constants to the error signal, the second gain constant being larger than the first gain constant; and

a control circuit coupled to control selective operation of the selective-gain feedback loop in response to a magnitude of the error signal, such that the selective-gain feedback loop applies the first gain constant when the magnitude of the error signal bears a first relationship to a predetermined threshold value, and the selective-gain feedback loop applies the second gain constant when the magnitude of the error signal bears a second relationship to the predetermined threshold value; wherein the second relationship is complimentary to the first relationship.